

WHAT IS CLAIMED IS:

1. Apparatus for displaying a three-dimensional image, comprising:

5 a plurality of lenslet pixel modules with each module defined in part by a respective lenslet;

each lenslet pixel module corresponding with a pixel of the three-dimensional image;

10 a plurality of two-dimensional moving image sources associated with and forming a portion of the lenslet pixel modules; and

the lenslet pixel modules cooperating with each other to form a projector array for displaying the three-dimensional image.

15 2. The apparatus of Claim 1 further comprising a fly's eye lens sheet having a plurality of fly's eye lenslets disposed thereon to provide the respective lenslet for each lenslet pixel module.

20 3. The apparatus of Claim 1 further comprising at least one lenslet pixel module having a partially silvered mirror and a sensor disposed adjacent thereto.

4. The apparatus of Claim 1 further comprising at least one lenslet pixel module having a high resolution two-dimensional digital image source associated with and forming a portion of the at least one lenslet pixel module.

5. The apparatus of Claim 1 further comprising:
the plurality of lenslet pixel modules disposed in an array relative to each other;
at least two of the lenslet pixel modules having a respective sensor disposed therein;
the sensors cooperating with each other to form a sensor array having a first focal plane;
the plurality of fly's eye lenslets associated with the lenslet pixel modules cooperating with each other to form a projector array having a second focal plane; and
the focal plane of the sensor array corresponding generally with the focal plane of the projector array.

6. The apparatus of Claim 5 wherein at least one sensor comprises a video sensor.

7. The apparatus of Claim 5 wherein at least one sensor comprises a charge coupled device.

8. The apparatus of Claim 1 wherein the three-dimensional image is full parallax.

9. The apparatus of Claim 1 further comprising:
the plurality of lenslet pixel modules disposed in
an array relative to each other;

at least two of the lenslet pixel modules having a
5 respective sensor disposed therein; and

the sensors cooperating with each other to form a
sensor array for sensing at least one real three-
dimensional object.

10 10. The apparatus of Claim 9 further comprising a
central processing unit operable to receive information
from the sensor array and to provide information to the
projector array to allow interaction between the at least
one real three-dimensional object and the three-
15 dimensional image.

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20 11. The apparatus of Claim 1 further comprising the
high resolution two-dimensional image source selected
from the group consisting of a cathode ray tube, a liquid
crystal display, digital micro device mirror, a flat
panel display, a respective section of a diffuser
backlit by a video projection system, a
microelectronicmechanical system, or a light emitting
diode.

12. The apparatus of Claim 1 further comprising:
the plurality of lenslet pixel modules disposed in
an array relative to each other; and

5 a high resolution two-dimensional image source
associated with each respective lenslet pixel module.

13. The apparatus of Claim 1 further comprising:
the plurality of lenslet pixel modules disposed in
an array relative to each other;

10 a two-dimensional high resolution image source
associated with two or more lenslet pixel modules; and

each of the lenslet pixel modules associated with a
dedicated region of the respective high resolution two-
dimensional image source.

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14. The apparatus of Claim 1 further comprising:
the plurality of lenslet pixel modules disposed in
an array relative to each other;

20 a plurality of sensors interspersed within the array
of lenslet pixel modules;

the sensors cooperating with each other to form a
sensor array having a first focal plane; and

25 the lenslet pixel modules cooperating with each
other to form a projector array having a second focal
plane.

15. The apparatus Claim 14 further comprising the focal plane of the sensor array corresponding generally with the focal plane of the projector array.

5 16. The apparatus of Claim 14 further comprising the focal plane of the sensor array having an orientation different from the focal plane of the projector array.

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17. A system for presenting a scalable,
autostereoscopic image comprising:

a plurality of lenslet pixel modules with each
module defined in part by a respective lenslet;

5 each lenslet pixel module corresponding with a 3D
pixel of the autostereoscopic image;

a plurality of two-dimensional image sources
associated with and forming a portion of each lenslet
pixel module; and

10 at least one computer processing unit providing an
input to the two-dimensional high resolution image
sources.

18. The system of Claim 17 wherein the input
15 supplied to the two-dimensional image sources comprises
digital data corresponding to a two- dimensional image.

19. The system of Claim 17 wherein the input
supplied to the two-dimensional image source comprises a
20 moving video image.

20. The system of Claim 17 wherein the
autostereoscopic image is full parallax.

21. The system of Claim 17 further comprising:
a plurality of first computer processing units
having at least one video output channel to supply video
images to the high resolution two-dimensional image
sources;

two-dimensional image source coupled with one of the
first computer processing units; and

a master computer processing unit coupled with and
supplying data to the first computer processing units.

22. The system of Claim 17 further comprising:
a plurality of sensors with each sensor disposed
within one of the lenslet pixel modules; and

each sensor coupled with the computer processing
unit to provide information to the computer processing
unit concerning a real object in front of the lenslet
pixel modules.

23. The system of Claim 17 wherein the lenslets
further comprise a plurality of lens selected from the
group consisting of cylindrical, convex, concave,
gradient index, diffractive, refractive, holographic
optical elements and other prisms which form an
autostereoscopic image.

24. The system of Claim 17 further comprising:
a plurality of sensors with each sensor coupled with
the computer processing unit to provide information to
the computer processing unit concerning a real object in
front of the lenslet pixel modules;
a portion of the sensors providing high resolution
information about the real object; and
a portion of the sensors providing low resolution
information about the real object.

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25. A method for presenting an autostereoscopic image comprising:

combining a plurality of high resolution two-dimensional digital image sources with a plurality of lenslet pixel modules with each pixel module having a respective fly's eye lenslet; and

projecting light from each digital image source through the respective lenslet pixel module to form the autostereoscopic image.

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26. The method of Claim 25 further comprising installing at least two sensors within respective lenslet pixel modules for use in sensing at least one real object disposed in front of the lenslet pixel modules.

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27. The method of Claim 25 further comprising: sensing at least one real object disposed in front of the lenslet pixel modules with the sensors; and

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combining information received from the sensors concerning the at least one real object with information supplied to the high resolution two-dimensional image sources to allow interaction between the at least one real object and the full-parallax autostereoscopic image produced by the lenslet pixel modules.

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28. The method of Claim 25 wherein the autostereoscopic image is full parallax.

29. A lenslet pixel module for projecting light and sensing light comprising:

5 a two-dimensional image source operably coupled with a respective lenslet whereby a portion of a selected two-dimensional image may be projected from the lenslet to form a portion of an image;

a sensor disposed within and forming a portion of the lenslet pixel module; and

10 the sensor operably coupled with the fly's eye lenslet to allow the sensor to detect at least one real object in front of the lenslet pixel module.

30. The lenslet pixel module of Claim 29 wherein the sensor further comprises a digital video camera.

31. The lenslet pixel module of Claim 29 further comprising a portion of a full parallax three-dimensional electronic display.

20 32. The lenslet pixel module of Claim 29 further comprising the two-dimensional image source operable to form a portion of the image and the sensor operable to detect electromagnetic radiation from the at least one real object at substantially the same time.

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